

# NOAA ESRL GLOBAL MONITORING ANNUAL CONFERENCE 2013

David Skaggs Research Center, Room GC-402  
325 Broadway, Boulder, Colorado 80305 USA

## Tuesday Morning, May 21, 2013 AGENDA

(Only presenter's name is given; please refer to abstract for complete author listing.)

- 07:30 **Registration Opens in GC-402 - lunch orders and posters collected at registration table**
- 07:30 - 08:15 **Morning Snacks - Coffee, tea, fruit, bagels and donuts served**
- Page No.
- **Session 1** **Welcome, Keynote Address and Introductory Papers** — Chaired by Russ Schnell
  - 08:15 - 08:25 Welcome and Conference Overview -  
*James H. Butler (Director, NOAA/Earth System Research Laboratory/GMD, Boulder, CO)*
  - 08:25 - 08:35 The Earth System Research Laboratory -  
*Alexander E. MacDonald (Director, NOAA/Earth System Research Laboratory, Boulder, CO)*
  - 08:35 - 08:40 Introduction of Keynote Speaker -  
*James H. Butler (Director, NOAA/Earth System Research Laboratory/GMD, Boulder, CO)*
  - 08:40 - 09:10 Greenhouse Gases, Climate Change and Sustainability: Why Ignorance Is Not Bliss 1  
*Jim White (Institute of Arctic and Alpine Research (INSTAAR), University of Colorado, Boulder, CO)*
  - 09:10 - 09:30 The End of Cheap Fossil Fuels 2  
*Pieter Tans (NOAA Earth System Research Laboratory, Boulder, CO)*
  - 09:30 - 09:45 Global Ocean Carbon Uptake: Magnitude, Variability and Trends 3  
*Rik Wanninkhof (NOAA Atlantic Oceanographic and Meteorological Laboratory, Miami, FL)*
  - 09:45 - 10:00 Achievements and Prospects of the China Meteorological Administration / NOAA Bilateral Cooperation on GreenHouse Gases (GHGs) 4  
*Lingxi Zhou (China Meteorological Administration, Chinese Academy of Meteorological Sciences, Beijing, China)*
- 10:00 - 10:30 **Morning Break**
- **Session 2** **Carbon Cycle 1** — Chaired by John Miller
  - 10:30 - 10:45 Three-dimensional Behaviors of Atmospheric CO<sub>2</sub> Revealed by the Comprehensive Observation Network for Trace Gases by Airliner (CONTRAIL) Project 5  
*Toshinobu Machida (National Institute for Environmental Studies, Tsukuba-City, Ibaraki, Japan)*
  - 10:45 - 11:00 Global Monitoring of Atmospheric Composition by In-service Aircraft for a Global Observing System (IAGOS)-CORE Aircraft: Current Achievements and Future Developments Including Involvement of U.S. Partners 6  
*Andreas Petzold (Institute of Energy and Climate Research, IEK-8 Troposphere, Jülich, Germany)*
  - 11:00 - 11:15 Long-term Monitoring of Long-lived Greenhouse Gases (GHGs) and Short-lived Climate Pollutants in Asia and Oceania Using Voluntary Observing Ships 7  
*Hiroshi Tanimoto (National Institute for Environmental Studies, Tsukuba-City, Ibaraki, Japan)*
  - 11:15 - 11:30 Revision of the Historical Atmospheric CO<sub>2</sub> Record at Cape Grim and Expansion of the Atmospheric Observation Network in the Australian Region 8  
*Marcel van der Schoot (Commonwealth Scientific Industrial Research Organization (CSIRO), Aspendale, Australia)*
  - 11:30 - 11:45 Power Plant and Megacity CO<sub>2</sub> Observation from Greenhouse Gases Observing SATellite (GOSAT) 9  
*Tom Oda (Cooperative Institute for Research in the Atmosphere, Colorado State University, Fort Collins, CO)*
  - 11:45 - 12:00 Recent Analysis of the World Meteorological Organization (WMO) CO<sub>2</sub> Primary Standards 10  
*Brad Hall (NOAA Earth System Research Laboratory, Boulder, CO)*
- 12:00 - 13:00 **Catered Lunch Service - Outreach Classroom GB-124 (pre-payment of \$12.00 required at registration table)**

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## **Tuesday Afternoon, May 21, 2013 AGENDA**

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		Page No.
• <b>Session 3</b>	<b>Carbon Cycle 2</b> — Chaired by Arlyn Andrews	
13:00 - 13:15	Tracking Changing Arctic Methane Emissions <i>Ed Dlugokencky (NOAA Earth System Research Laboratory, Boulder, CO)</i>	11
13:15 - 13:30	Understanding and Quantifying CO <sub>2</sub> and CH <sub>4</sub> Greenhouse Gas Fluxes on the Regional Scale: The Project CarboCount CH <i>Dominik Brunner (EMPA, Laboratory for Air Pollution/Environmental Technology, Duebendorf, Switzerland)</i>	12
13:30 - 13:45	Updated Estimates of California's Urban and Rural Methane Emissions <i>Marc L. Fischer (Lawrence Berkeley National Laboratory, Berkeley, CA)</i>	13
13:45 - 14:00	Measuring CO <sub>2</sub> and CH <sub>4</sub> Emissions from Indianapolis: Preliminary Results from an Urban Atmospheric Inversion System <i>Kenneth J. Davis (Pennsylvania State University, University Park, PA)</i>	14
14:00 - 14:15	Methane Emission Flux from Indianapolis, IN: Identification and Contribution of Sources to the Total Citywide Emission <i>Maria Obiminda L. Cambaliza (Purdue University, Department of Chemistry, West Lafayette, IN)</i>	15
14:15 - 14:30	Estimation of CO <sub>2</sub> Emissions from Gas Flares Using Data Collected by the Suomi National Polar-orbiting Partnership (SNPP) Visible Infrared Imaging Radiometer Suite (VIIRS) <i>Chris Elvidge (NOAA National Geophysical Data Center, Boulder, CO)</i>	16
14:30 - 14:45	Gateway Pages to a Multi-institution, Geographically Distributed, Network of Data Sets for Atmospheric Trace Species <i>T.J. Blasing (Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, Oak Ridge, TN)</i>	17
14:45 - 15:00	Measuring Carbon Dioxide from Space: Prospects for the NASA Orbiting Carbon Observatory-2 (OCO-2) <i>David Crisp (Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA)</i>	18
• <b>15:00 - 15:30</b>	<b>Afternoon Break</b>	
• <b>Session 4</b>	<b>Aerosols</b> — Chaired by Patrick Sheridan	
15:30 - 15:45	Recommendations for the Interpretation of "Black Carbon" Measurements <i>John A. Ogren (NOAA Earth System Research Laboratory, Boulder, CO)</i>	19
15:45 - 16:00	Updates to ESRL's Flow-following Finite Volume Icosahedral Model (FIM)-Chem Global Modeling System and Comparison of Aerosol Optical Depth Forecasts with AEROSOL ROBOTIC NETWORK (AERONET) Observations <i>Georg Grell (NOAA Earth System Research Laboratory, Boulder, CO)</i>	20
16:00 - 16:15	Earth (and Lunar) Based Observations of Volcanic Emissions to the Stratosphere – An Update Through 2011 <i>Richard A. Keen (University of Colorado, Emeritus, Department of Atmospheric and Oceanic Sciences, Boulder, CO)</i>	21
16:15 - 16:30	Recent Anthropogenic Increases in Sulfur Dioxide from Asia Have Minimal Impact on Stratospheric Aerosol <i>Ryan R. Neely III (National Center for Atmospheric Research, Atmospheric Chemistry Division, Boulder, CO)</i>	22
16:30 - 16:45	Initial Study of the Roles of Chemical Composition and Meteorology on Aerosol Radiative Effects in the Southeast U.S. - Results from a Regionally-representative Site <i>Yong Zhou (Appalachian State University, Department of Chemistry, Boone, NC)</i>	23
• <b>17:00 - 20:00</b>	<b>Poster Session (DSRC Cafeteria) with appetizers and refreshments</b>	

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## Wednesday Morning, May 22, 2013 AGENDA

- **07:00 - 08:00** **Registration and Morning Snacks - Coffee, tea, fruit, bagels and donuts served**
- **Session 5** **Ozone and High Altitude Water Vapor** — Chaired by Sam Oltmans
  - 08:00 - 08:15 Southern Hemisphere Additional Ozonesondes (SHADOZ): Recent Accomplishments and Upcoming Activities with NOAA/GMD 24  
*Anne M. Thompson (Pennsylvania State University, Department of Meteorology, University Park, PA)*
  - 08:15 - 08:30 Contributions of Atmospheric Dynamics and Chemistry to Total Ozone Variability and Trends Across the United States: A Case Study Based on Long-term Ground Based Data Sets 25  
*Irina Petropavlovskikh (Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO)*
  - 08:30 - 08:45 South Pole Ozonesonde and Dobson Spectrophotometer Measurements in 2012 26  
*Bryan Johnson (NOAA Earth System Research Laboratory, Boulder, CO)*
  - 08:45 - 09:00 Global Surface Ozone Trends, a Synthesis of Recently Published Findings 27  
*Owen R. Cooper (Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO)*
  - 09:00 - 09:15 Changes in the Polar Vortex: Effects on Antarctic Total Ozone Observations at Various Stations and Antarctic Surface Climate Characteristics 28  
*Birgit Hassler (Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO)*
  - 09:15 - 09:30 Influences of the Asian Monsoon on Upper Troposphere and Lower Stratosphere (UTLS) Water Vapor, Ozone and Ice Particles: New Results from Kunming, China 29  
*Dale Hurst (Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO)*
  - 09:30 - 09:45 An Update on the Status of the Global Climate Observing System (GCOS) Reference Upper Air Network (GRUAN) 30  
*Greg Bodeker (Bodeker Scientific, Alexandra, New Zealand)*
- **09:45 - 10:15** **Morning Break**
- **Session 6** **Halocarbons and Non-CO<sub>2</sub> Greenhouse Gases** — Chaired by James Elkins
  - 10:15 - 10:30 The InGOS Project: Setup and First Results 31  
*Alex T. Vermeulen (Energy Research Center (ECN) of the Netherlands, Petten, The Netherlands)*
  - 10:30 - 10:45 Quantifying Sources of Methane Using Light Alkanes in the Los Angeles Basin, California 32  
*Jeff Peischl (Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO)*
  - 10:45 - 11:00 Regional Emission Estimates of Selected Anthropogenic Greenhouse Gases (HFC-134a, HCFC-22, and CH<sub>4</sub>) from California 33  
*Lei Hu (NOAA Earth System Research Laboratory, Boulder, CO)*
  - 11:00 - 11:15 <sup>14</sup>C-based Emission Estimates for Halocarbons and Other Greenhouse Gases Across the U.S. 34  
*Steve Montzka (NOAA Earth System Research Laboratory, Boulder, CO)*
  - 11:15 - 11:30 NOAA Global Monitoring Division HIAPER Pole-to-Pole Observations (HIPPO) Data Past and Future: Transport and Chemistry in the Troposphere 35  
*Fred L. Moore (Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO)*
  - 11:30 - 11:45 Non-Methane HydroCarbons (NMHCs) at the World Meteorological Organization (WMO) - Global Atmosphere Watch (GAW) Monte Cimone Station: Trends, Seasonal Variation and Source Characterization 36  
*Michela Maione (University of Urbino, Department of Basic Sciences and Foundations, Urbino, Italy)*
  - 11:45 - 12:00 Atmospheric Lifetimes of CCl<sub>3</sub>F (CFC-11) and NF<sub>3</sub>: Temperature Dependent Ultraviolet (UV) Absorption Cross Sections 37  
*Max R. McGillen (Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO)*
- **12:00 - 13:00** **Catered Lunch Service - Outreach Classroom GB-124 (pre-payment of \$12.00 required at registration table)**

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- **Session 7**     **Radiation** — Chaired by Joseph Michalsky
  - 13:00 - 13:15     Variability of the Total Surface Radiation Budget and Its Components Over the United States from 1996 Through 2011     38  
*John A. Augustine (NOAA Earth System Research Laboratory, Boulder, CO)*
  - 13:15 - 13:30     Multivariate Linear Regression Technique for Computing Solar Irradiance Estimations Using the SURFRAD and Integrated Surface Irradiance Study (ISIS) Networks     39  
*Christopher Clack (Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO)*
  - 13:30 - 13:45     Ground-based Radiation Budget and Aerosol Validation of the Geostationary Operational Environmental Satellite R-Series (GOES-R) Products Using a NOAA Mobile SURFRAD Station     40  
*Kathleen Lantz (Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO)*
  - 13:45 - 14:00     Department of Energy (DOE) Atmospheric Radiation Measurement (ARM) Climate Research Facilities: Updates on Barrow, Oliktok, Atqasuk, Unmanned Aerial Vehicles, Tethered Balloons, Field Campaigns and Selected Significant Results     41  
*Mark Ivey (Sandia National Laboratories, Albuquerque, NM)*
  
- **Session 8**     **Gas and Oil Fields 1: Winter Ozone** — Chaired by Russ Schnell
  - 14:00 - 14:15     Observations of Wintertime Ozone Production in the Uintah Basin of Utah in 2013     42  
*Samuel Oltmans (Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO)*
  - 14:15 - 14:30     Non-Methane Hydrocarbons During Winter Ozone Production Events in the Uintah Basin     43  
*Chelsea Stephens (Institute of Arctic and Alpine Research (INSTAAR), University of Colorado, Boulder, CO)*
  
- **14:30 - 14:45**     **Afternoon Break**
  
- **Session 9**     **Gas and Oil Fields 2: Oil Field Winds and Methane** — Chaired by Gabrielle Petron
  - 14:45 - 15:00     Emissions of CH<sub>4</sub> from Natural Gas Production in the United States Using Aircraft-based Observations     44  
*Colm Sweeney (Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO)*
  - 15:00 - 15:15     Observing Boundary Layer Properties with Doppler Lidar for Mass-balance Estimates of Greenhouse Gas Emissions     45  
*R. Michael Hardesty (Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO)*
  - 15:15 - 15:30     Using Laser-based Technology to Quantify Fugitive Methane Emission Rates Quickly and Easily     46  
*Tracy Tsai (Picarro Inc, Santa Clara, CA)*
  - 15:30 - 15:45     Quantifying the Relative Contribution of Natural Gas Fugitive Emissions to Total Methane Emissions in Colorado, Utah and Texas Using Mobile δ<sup>13</sup>CH<sub>4</sub> Analysis     47  
*Chris W. Rella (Picarro Inc, Santa Clara, CA)*
  - 15:45 - 16:00     Locating and Quantifying Methane Gas Emissions Using Remotely Obtained Concentration Data from Aircraft     48  
*Bill Hirst (Shell Global Solutions International B.V., The Hague, The Netherlands)*
  - 16:00 - 16:15     Ground Measurements of Ethane to Methane Ratios in the Dallas/Fort-Worth Area     49  
*Tara Yacovitch (Aerodyne Research, Inc., Billerica, MA)*
  
- **16:15**     **Closing Remarks - Dr. Russ Schnell (NOAA/Earth System Research Laboratory/GMD)**

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## **Tuesday, May 21, 2013 17:00 - 20:00 POSTER SESSION AGENDA**

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### **• Gas and Oil Field Ozone and Effluents**

- P-1 Emissions from Oil and Gas Operations and Their Role in Ozone Production in the Uintah Basin, Utah  
*Jeong-Hoo Park (Institute of Arctic and Alpine Research (INSTAAR), University of Colorado, Boulder, CO)*
- P-2 Exceptionally Elevated Winter Photochemical Ozone Production in the Uintah Basin, Utah  
*Russell C. Schnell (NOAA Earth System Research Laboratory, Boulder, CO)*
- P-3 Ozone Vertical Profiles and Buildup During the 2013 Uintah Basin Winter Ozone Study  
*Jason Evans (Institute of Arctic and Alpine Research (INSTAAR), University of Colorado, Boulder, CO)*
- P-4 Emissions from Three Oil and Gas Facilities Off the Gulf Coast of Mexico  
*Scott Herndon (Aerodyne Research, Inc., Billerica, MA)*
- P-5 Increased Surface Ozone with Relation to Wildfires in the Western United States (U.S.)  
*Audra McClure-Begley (Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO)*
- P-6 Taking Science on the Road  
*Jonathan Kofler (Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO)*
- P-7 Addressing Science and Policy Needs with Community Emissions Efforts  
*Claire Granier (Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO)*

### **• Chinese Atmospheric Watch Regional Measurements and Cape Verde CVAO**

- P-8 The Current Status and Future of the China Atmosphere Watch (CAW) Program of the China Meteorological Administration (CMA)  
*Kejun Wu (China Meteorological Administration, Meteorological Observation Center, Beijing, China)*
- P-9 Trend of Acid Rain Over China Since the 1990s  
*Jie Tang (China Meteorological Administration, Meteorological Observation Center, Beijing, China)*
- P-10 Science Highlights from the Cape Verde Atmospheric Observatory (CVAO)  
*Katie Read (University of York, National Centre for Atmospheric Science, York, United Kingdom)*

### **• NOAA Earth information Services and "Elementa", a New Scientific Journal**

- P-11 Interactive Visualization Using NOAA's Earth Information Services and TerraViz  
*Eric Hackathorn (NOAA Earth System Research Laboratory, Boulder, CO)*
- P-12 Elementa: Science of the Anthropocene – A New Nonprofit, Open-access Journal Publishing Scientific Research Specific to the Anthropocene in a Multidisciplinary Format  
*Detlev Helmig (Institute of Arctic and Alpine Research (INSTAAR), University of Colorado, Boulder, CO)*

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### • **Carbon Cycle - Carbon Dioxide**

- P-13 Quantification of Urban Fossil Fuel CO<sub>2</sub> Emissions from the Indianapolis Flux Project (INFLUX)  
*Colm Sweeney (Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO)*
- P-14 Combining CO<sub>2</sub> Observations from Towers, Aircraft Profiles and a Car-mounted Instrument Using a Combination of Transport Modeling and Neural Networks  
*Andres Schmidt (Oregon State University, Corvallis, OR)*
- P-15 A Multi-year Record of Airborne CO<sub>2</sub> Observations in the U.S. Southern Great Plains  
*Sebastien C. Biraud (Earth Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA)*
- P-16 How Well Tall Tower Measurements Characterize the Mid-Planetary Boundary Layer (PBL) CO<sub>2</sub> Mole Fraction  
*Laszlo Haszpra (Hungarian Meteorological Service, Geodetic & Geophysical Institute, Research Centre for Astronomy & Earth Sciences, Hungarian Academy of Science, Budapest, Hungary)*
- P-17 Progress Towards a Multi-year Continental Inversion Using The Weather Research and Forecast (WRF) - Lagrangian Particle Dispersion Model and the North American Tower Network  
*Kenneth Davis (Pennsylvania State University, University Park, PA)*
- P-18 Full Column Greenhouse Gas Profiles Measured with AirCore at the Atmospheric Radiation Measurement (ARM) Southern Great Plains (SGP) Site  
*Marc L. Fischer (Lawrence Berkeley National Laboratory, Berkeley, CA)*
- P-19 Air as Syrup – The Flow and Mixing of Air in the AirCore  
*Pieter Tans (NOAA Earth System Research Laboratory, Boulder, CO)*
- P-20 Earth Networks' Atmospheric GreenHouse Gas (GHG) Observations for Research and Modeling at Multiple Scales  
*Elena Novakovskaia (Earth Networks, Inc., Germantown, MD)*
- P-21 Variations of CO<sub>2</sub> Mixing Ratios in the Air Near the Ground in the European Territory of Russia  
*Felix Kashin (Federal State Budgetary Institution Research and Production Association "Typhoon", Obninsk, Russia)*
- P-22 Estimation of Anthropogenic Emission of Carbon Dioxide from Measurement Data of CO<sub>2</sub> Concentration Obtained in Obninsk and at the World Meteorological Organization (WMO)/Global Atmosphere Watch (GAW) Stations  
*Felix Kashin (Federal State Budgetary Institution Research and Production Association "Typhoon", Obninsk, Russia)*

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### • **Carbon Cycle - Methane, Carbon Monoxide, NMHCs and Isotopes**

- P-23 Investigation of the Ethane-Methane Relationship at the NOAA Global Cooperative Air Sampling Network Sites  
*Angelica L. Hollister (Institute of Arctic and Alpine Research (INSTAAR), University of Colorado, Boulder, CO)*
- P-24 Long-term Decline of Global Atmospheric Ethane Concentrations and Implications for Methane  
*Isobel J. Simpson (University of California at Irvine, Department of Chemistry, Irvine, CA)*
- P-25 Tracking Variability in Methane Source Signatures in the NOAA Global Cooperative Air Sampling Network  
*Sylvia E. Michel (Institute of Arctic and Alpine Research (INSTAAR), University of Colorado, Boulder, CO)*
- P-26 A Multi-tower Measurement Network Estimate of California's Methane Emissions  
*Marc L. Fischer (Lawrence Berkeley National Laboratory, Berkeley, CA)*
- P-27 Influences of Asian Continental Outflow on the Trace Gas Levels at Dongsha Island in the South China Sea  
*Chang-Feng Ou-Yang (National Central University, Department of Chemistry and Department of Atmospheric Sciences, Jhongli, Taiwan)*
- P-28 Global Reanalysis of Reactive Gases in the Monitoring Atmospheric Composition and Climate (MACC) Project: Validation with *in Situ* and Satellite Observations  
*Idir Bouarar (LATMOS, Université Pierre et Marie Curie and Centre National de la Recherche Scientifique, Paris, France)*
- P-29 The World Meteorological Organization (WMO) Central Calibration Laboratory for Carbon Monoxide  
*Paul Novelli (NOAA Earth System Research Laboratory, Boulder, CO)*
- P-30 Sensitivity Study of Impact of Isoprene Emission Estimates on Modeled CO Concentration  
*Katerina Zemankova (LATMOS, Université Pierre et Marie Curie and Centre National de la Recherche Scientifique, Paris, France)*
- P-31 Climatology and Atmospheric Chemistry of Non-Methane Hydrocarbon Emissions Over the North Atlantic  
*Mauricio Muñoz (Institute of Arctic and Alpine Research (INSTAAR), University of Colorado, Boulder, CO)*
- P-32 Recent Increase in Seasonal Amplitudes of CO<sub>2</sub> and δ<sup>13</sup>CO<sub>2</sub> Over Canada and Their Implications  
*Lin Huang (Environment Canada, Climate Research Division, Atmospheric Science Technology Directorate/STB, Toronto, Canada)*
- P-33 Can We Use δ<sup>13</sup>C of CO<sub>2</sub> to Understand the Links Between the Water and Carbon Cycles and Climate?  
*Caroline Alden (Institute of Arctic and Alpine Research (INSTAAR), University of Colorado, Boulder, CO)*

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### • **Halocarbons**

- P-34 Validation of Satellite Ozone-depleting Substance Measurements with Airborne Platforms  
*J. David Nance (Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO)*
- P-35 Recent Results from the Airborne Tropical Tropopause Experiment (ATTREX)  
*Eric J. Hintsas (Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO)*
- P-36 An Updated Record of Long-lived Halocarbons  
*Geoffrey S. Dutton (Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO)*
- P-37 Quarter Century of NOAA Airborne Observations of Halocarbons and Other Atmospheric Trace Species  
*James W. Elkins (NOAA Earth System Research Laboratory, Boulder, CO)*
- P-38 A Novel Cryogenic Analyte Preconcentration Module for Trace Gas and Isotopic Analyses  
*Benjamin R. Miller (Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO)*
- P-39 Atmospheric Chemistry of Methyl-Perfluoro-Heptene-Ethers (MPHEs): OH Radical Reaction Rate Coefficients, Atmospheric Lifetimes and Global Warming Potentials  
*Aaron M. Jubb (Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO)*

### • **Aerosols, Radiation and Water Vapor**

- P-40 A 23-year Record of Twice-weekly Aerosol 1 Composition Measurements at Mauna Loa Observatory  
*Nicole Hyslop (University of California at Davis, Crocker Nuclear Laboratory, Davis, CA)*
- P-41 Gypsum Aerosol Downwind of White Sands, NM  
*Warren H. White (University of California at Davis, Crocker Nuclear Laboratory, Davis, CA)*
- P-42 Laboratory Studies of Filter-based Aerosol Light Absorption Measurements  
*Patrick Sheridan (NOAA Earth System Research Laboratory, Boulder, CO)*
- P-43 Short-term Variability of Aerosol Optical Properties at NOAA'S Federated Aerosol Network  
*Elisabeth Andrews (Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO)*
- P-44 Atmospheric Research of The Atmosphere, Climate and Radiation in Extremadura (AIRE) Group at the University of Extremadura (Spain)  
*Ana Alvarez Piedehierro (University of Extremadura, Department of Physics, Badajoz, Spain)*
- P-45 A Characterization of Arctic Aerosols and Their Forcing of the Surface Radiation Budget  
*Robert S. Stone (Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO)*
- P-46 Observations of Water Vapor and Total Water in the Extremely Dry Tropical Tropopause Layer (TTL) From the NASA Global Hawk  
*Andrew Rollins (Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO)*
- P-47 Two Years of Continuous Water Vapor Isotope Ratio Measurements at Mauna Loa: A New Glimpse Into Humidity Controls in the Subtropics  
*Adriana Bailey (Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO)*

### • **Additional Oil and Gas Effluents**

- P-48 An Airborne Study of Methane Point Source Dispersion and Mixed Layer Scaling  
*Stephen Conley (University of California at Davis, Davis, CA)*